

Pile Supported Low Profile Arch

Challenge - A deteriorating bridge in an agricultural setting over Fortune Creek, Spallumcheen, BC, required replacement. Budget constraints did not allow for significant changes to the horizontal or vertical road alignment. The area, characterized by deep fine-textured soils, required an innovative design to support the structure.

Solution - Landmark was retained to design, supply and install a low profile arch culvert with minimal vertical fill. The bearing capacity of the foundation soil required timber piles to support the precast footings. The arch length was designed for two way traffic. Preassembly in an adjacent staging area provided for crane-lifting into place. A cobble-faced GRS (Geosynthetic Reinforced Soil) wall with multiple layers of geotextile retains the soil mass using local material.

Specs -

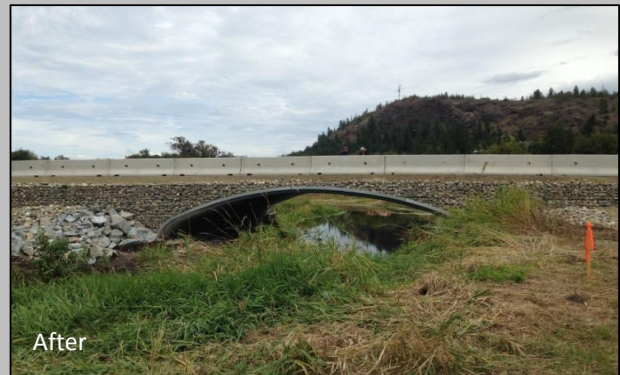
Arch Span - 11.0 m

Rise - 2.5 m

Arch Length - 12.9 m

Pile depth - 8-15 m (25-50')

Design load - BCL 625



Silt curtains are installed to reduce sedimentation and a tarp installed under the old structure to catch debris during bridge removal. Steel sheet piles are driven to allow for footing excavation. The wooden work platform is supported by the sheet pile wall to provide workers access to both sides of the job site.



More than 100 fir-larch piles are driven to support the arch footing. Piles are cut even and a levelling course of sand is added. It is then capped with a 6" thick platform (access mat) and is covered with geotextile and gravel prior to footing placement.

Concept to Completion



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Benefits

- ✓ Improved Road Safety by Double Lining
- ✓ Maintained Stream Integrity
- ✓ Fish & Wildlife Friendly
- ✓ Low or No Maintenance
- ✓ Use of Local Materials



Concrete footings are placed on top of compacted fill. Cobble is positioned prior to the arch being installed. Successive crane lifts allow for the arch sections to be repositioned from the staging area and bolted to the footing plate as well as each other prior to torquing to design specifications.



Alternating layers of compacted soil and geosynthetic fabric are contained within wire forms, faced with cobble stone. The process continues until the entire culvert is covered. The finished road, designed for highway loading, includes paving, line painting, and the installation of no-post barriers.

